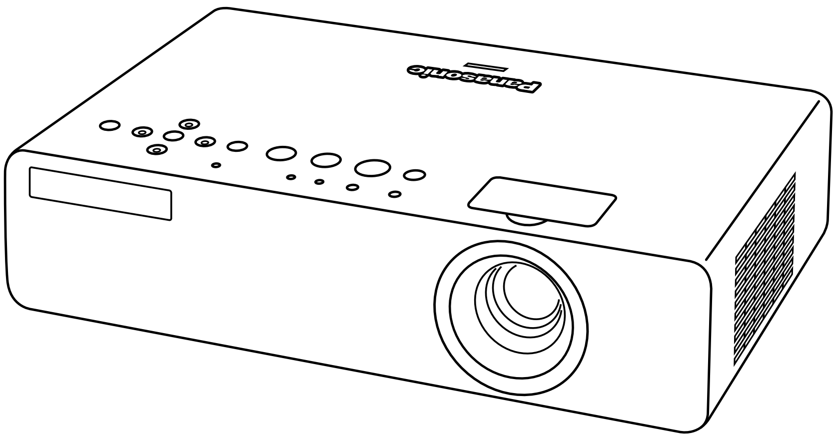
Panasonic ideas for life

SPEC FILE



Product Number : PT-**LB90NT**

Product Name : LCD Projector

Portable LCD Projector **PT-LB90NT**

Specifications

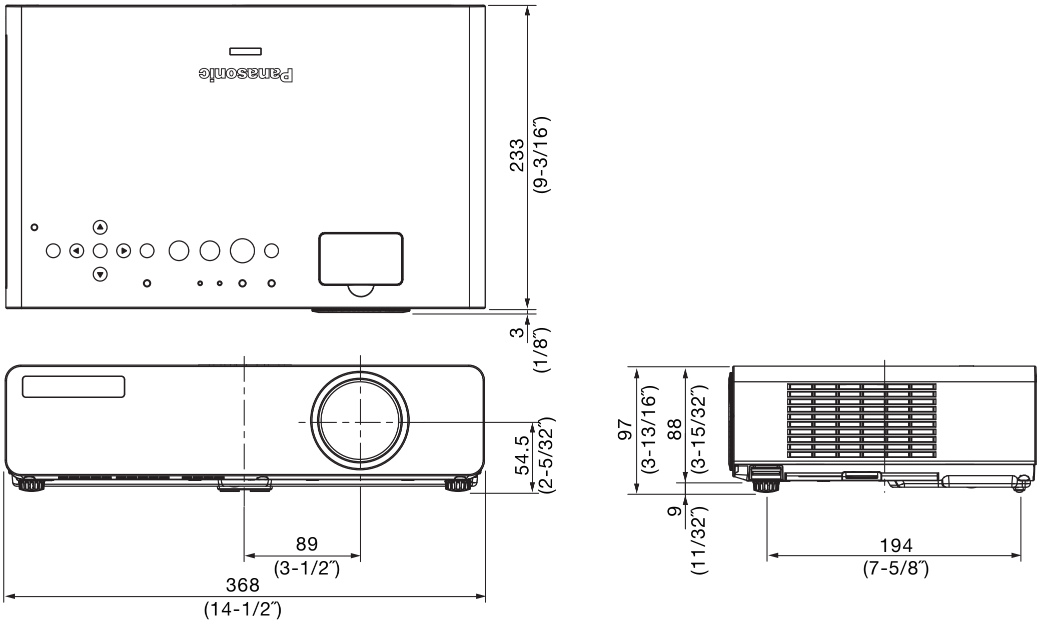
Power supply		100–240 V AC, 50/60 Hz
Power consumption		300 W (0.9 W*1 in standby eco mode. 20 W in normal standby mode. 23 W in normal standby mode when set to audio monitor out and with fan stopped).)
Optical system		Dichroic mirror separation/prism synthesis system
LCD panel	Panel size	0.63″ (16 mm) diagonal (4:3 aspect ratio)
	Display method	Transparent LCD panel (x 3, R/G/B)
	Drive method	Active matrix
	Pixels	786,432 (1,024 x 768) x 3, total of 2,359,296 pixels
	Pixel configuration	Stripe
Lens		Manual zoom (1:1–1:1.2), manual focus F 1.65–1.93, f 18.53–22.18 mm
Throw ratio		1.4–1.7:1
Lamp		220 W UHM lamp
Projection size		838–7,620 mm (33–300 inches) diagonally, 4:3 aspect ratio
Colors		Full color (16,777,216 colors)
Brightness*2		3,500 lumens
Center-to-corner uniformity ratio*2		85%
Contrast ratio*2		500:1 (full on/full off)
Resolution RGB		1,024 x 768 pixels (Input signals that exceed this resolution will be converted to 1,024 x 768 pixels.)
Scanning frequency	RGB	Horizontal: 15.00–91.00 kHz, Vertical: 50–85 Hz
	YP_BP_R	480i (525i): f_H 15.75 kHz; f_V 60 Hz 576i (625i): f_H 15.63 kHz; f_V 50 Hz 480p (525p): f_H 31.50 kHz; f_V 60 Hz 576p (625p): f_H 31.25 kHz; f_V 50 Hz 720/60p (750p): f_H 45.00 kHz; f_V 60 Hz 720/50p (750p): f_H 37.50 kHz; f_V 50 Hz 1080/60i (1125i): f_H 33.75 kHz; f_V 60 Hz 1080/50i (1125i): f_H 28.13 kHz; f_V 50 Hz
	S-Video/Video	NTSC, NTSC4.43, PAL-M, PAL60: f_H 15.75 kHz; f_V 60 Hz PAL, SECAM, PAL-N: f_H 15.63 kHz; f_V 50 Hz
Optical axis shift		5:1 (fixed)
Keystone correction range		Approx. ±30° vertically
On-screen menu		17 languages: English, French, German, Spanish, Italian, Korean, Russian, Chinese, Japanese, Swedish, Norwegian, Danish, Portuguese, Polish, Hungarian, Czech, and Thai
Installation		Front/rear, ceiling/desk (menu selection)
Built-in speakers	Size	4 x 2 cm, x 1, oval
	Output power	1.0 W (monaural)
Terminals	COMPUTER (RGB) 1 IN	D-sub HD 15-pin (female) x 1
	RGB signal	G: 0.7 V [p-p] (1.0 V [p-p] for sync on green signals), 75 ohms, R, B: 0.7 V [p-p], 75 ohms, HD/SYNC, VD: TTL (positive/negative polarity compatible)
	YP_BP_R signal	Y: 1.0 V [p-p] (including sync signal), 75 ohms, P_B, P_R: 0.7 V [p-p], 75 ohms
	COMPUTER (RGB) 2 IN	D-sub HD 15-pin (female) x 1
	RGB signal	G: 0.7 V [p-p] (1.0 V [p-p] for sync on green signals), 75 ohms, R, B: 0.7 V [p-p], 75 ohms, HD/SYNC, VD: TTL (positive/negative polarity compatible)
	YP_BP_R signal	Y: 1.0 V [p-p] (including sync signal), 75 ohms, P_B, P_R: 0.7 V [p-p], 75 ohms
	VIDEO IN	RCA pin x 1, 1.0 V [p-p], 75 ohms
	S-VIDEO IN	Mini DIN 4-pin x 1, Y: 1.0 V [p-p], C: 0.286 V [p-p], 75 ohms
	COMPUTER (RGB) 1/2 AUDIO IN	M3 (L, R) x 1, 0.5 V [rms]
	VIDEO/S-VIDEO AUDIO IN	RCA (L, R) x 1, 0.5 V [rms]
	VARIABLE AUDIO OUT	M3 (L, R) x 1, 0–2.0 V [rms]
	SERIAL	D-sub 9-pin x 1, for external control (RS-232C compliant)
	LAN	RJ-45 x 1, compatible with PJLink™ (class 1), 10BASE-T/100BASE-TX
Power cord length		2 m/6.6′
Cabinet material		Moulded plastic (PC+ABS)
Dimensions (W x H x D)		368 x 88 x 233 mm (14-1/2″ x 3-15/32″ x 9-3/16″)*3

Weight*4		Approx. 2.96 kg (6.5 lbs.)
Operating environment	Temperature	0°–40°C (32°–104°F)
	Humidity	20%–80% (no condensation)
Remote control unit	Power supply	3 V DC (AA battery x 2)
	Operation range*5	Approx. 15 m (49´3˝) when operated from directly in front of the signal receptor
	Dimensions (W x H x D)	48 x 163 x 24.5 mm (1-7/8˝ x 6-13/32˝ x 31/32˝)
	Weight*4	Approx. 117 g (4.1 oz) (including batteries)
Wireless LAN	Standard	IEEE 802.11b/g (ARIB STD-T66)
	Modulation	
	IEEE 802.11b	Direct sequence spread spectrum (DS-SS) system
	IEEE 802.11g	Orthogonal frequency division multiplex (OFDM) system
	Transmission system	
	IEEE 802.11b	CCK (11/5.5 Mbps), DQPSK (2 Mbps), DBPSK (1 Mbps)
	IEEE 802.11g	64-QAM (54/48 Mbps), 16-QAM (36/24 Mbps), QPSK (18/12 Mbps), BPSK (9/6 Mbps)
	Transmission speed	
	IEEE 802.11b	11 Mbps, 5.5 Mbps, 2 Mbps, 1 Mbps
	IEEE 802.11g	54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, 6 Mbps
	Operating range*5	Approx. 30 m (98´5˝)
	Frequency range	PT-LB90NTE/LB90NTEA: 2,412 MHz–2,472 MHz PT-LB90NTU: 2,412 MHz–2,462 MHz
	Channels	PT-LB90NTE/LB90NTEA: 1–13 ch PT-LB90NTU: 1–11 ch
Wireless Manager ME 5.5 system requirements		To use network functions, a PC is required that meets the conditions given below.
	OS	Microsoft® Windows® 2000 Professional SP4, Windows® XP Professional, Windows® XP Home Edition, Windows® XP Tablet PC Edition 2005, Windows Vista® Ultimate 32-bit, Windows Vista® Business 32-bit, Windows Vista® Home Premium 32-bit, Windows Vista® Home Basic 32-bit Apple Mac OS X 10.4 (Tiger) and OS X 10.5 (Leopard) **NOTE: Some functions are not available with Windows Vista® and Mac.**
	Web browser	Windows®: Internet Explorer 6.0 or later, or Netscape Communicator 7.0 or later Mac OS: Safari 2.0 or later
	CPU	Windows®: Intel® Pentium® III or higher, or other compatible processor (1 GHz or higher is recommended.) Mac OS X: 1-GHz or higher PowerPC G4, or 1.8-GHz or higher Intel® Core™ processor
	Memory	256 MB or more (512 MB or higher is recommended for Mac OS X)
	Free hard disk space	60 MB or more
	CD-ROM drive	CD-ROM drive or DVD drive
	Wireless LAN	IEEE 802.11b/g compatible (built-in wireless LAN system or external IEEE 802.11b/g LAN card must be installed and running normally.) **NOTE: Some IEEE 802.11g/b wireless LAN may not allow connection to the projector. For Mac OS, Built-in IEEE 802.11b/g wireless LAN adapter must be installed and running normally.**
	Wired LAN connector	RJ-45
Supplied accessories		Power cord Power cord secure lock Wireless remote control Batteries for remote control VGA cable for RGB signals (1.8 m/5´11˝) Carrying bag Wireless Manager ME 5.5 (CD-ROM)
Optional accessories		Replacement lamp unit: ET-LAB80 Ceiling mount bracket: ET-PKB80

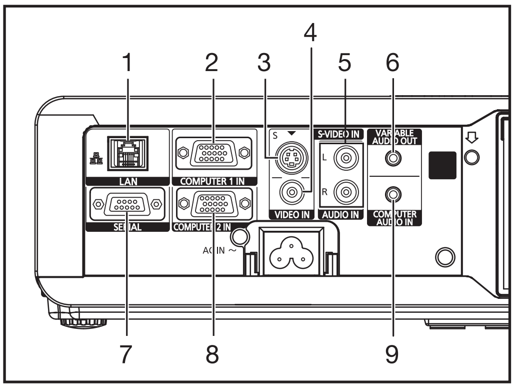
***1: In standby eco mode, network functions such as Standby On via LAN are not available, and only certain commands can be received from RS-232C control. *2: Measurement, measuring conditions, and method of notation all comply with ISO 21118 international standards. *3: Protruding parts not included. *4: Average value. May differ depending on models. *5: Operation range differs depending on environments.**

Dimensions

unit : mm (inch)
NOTE: This illustration is not drawn to scale.



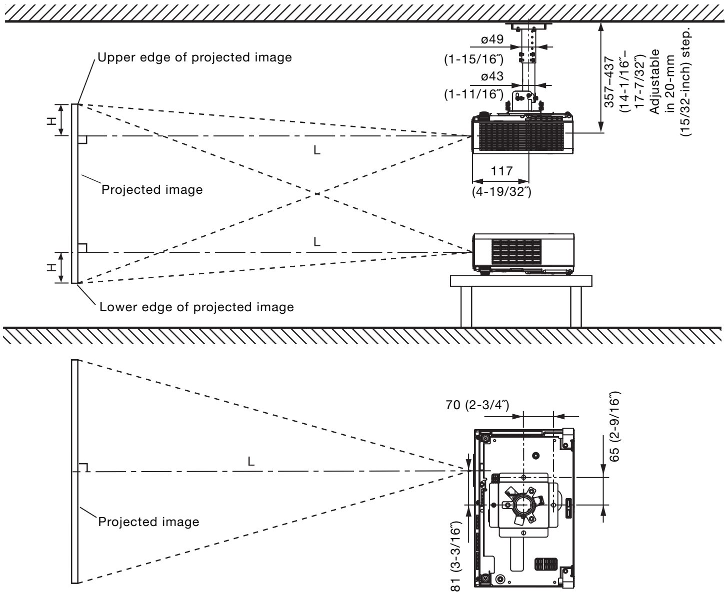
Terminals



1 LAN terminal
2 COMPUTER (RGB) 1 input
3 S-Video input
4 Video input
5 Audio input for Video/S-Video
6 Audio output
7 Serial input
8 COMPUTER (RGB) 2 input
9 Audio input for COMPUTER 1/2

Standard setting-up positions

unit : mm (inch)



L: Distance to screen
H: Height from the edge of screen to center of lens

NOTE:

Illustrations show the projector installed using optional ceiling bracket.

This illustration is not drawn to scale.

Projection size (diagonal)	Projection distance (L) Min (wide)	Max (telephoto)	Height from the edge of screen to center of lens (H)
0.84 m / 33″	– / –	1.1 m / 3.7′	0.08 m / 0.28′
1.02 m / 40″	1.1 m / 3.7′	1.4 m / 4.5′	0.10 m / 0.33′
1.27 m / 50″	1.4 m / 4.7′	1.7 m / 5.6′	0.13 m / 0.42′
1.52 m / 60″	1.7 m / 5.6′	2.1 m / 6.8′	0.15 m / 0.50′
1.78 m / 70″	2.0 m / 6.6′	2.4 m / 7.9′	0.18 m / 0.58′
2.03 m / 80″	2.3 m / 7.6′	2.8 m / 9.1′	0.20 m / 0.67′
2.29 m / 90″	2.6 m / 8.5′	3.1 m / 10.2′	0.23 m / 0.75′
2.54 m / 100″	2.9 m / 9.5′	3.5 m / 11.4′	0.25 m / 0.83′
3.05 m / 120″	3.5 m / 11.4′	4.2 m / 13.7′	0.30 m / 1.00′
3.81 m / 150″	4.3 m / 14.3′	5.2 m / 17.1′	0.38 m / 1.25′
5.08 m / 200″	5.8 m / 19.0′	7.0 m / 22.9′	0.51 m / 1.67′
6.35 m / 250″	7.3 m / 23.8′	8.7 m / 28.7′	0.64 m / 2.08′
7.62 m / 300″	8.7 m / 28.6′	10.5 m / 34.4′	0.76 m / 2.50′

* This distance is especially recommended for ceiling-mounted use and other permanent installations.

NOTE:

Values shown are approximate.

The value for L (distance to screen) varies slightly depending on the zoom lens characteristics.

When the shortest projection distance is used, a small amount of distortion may occur in the image due to the zoom lens characteristics.

Calculation of the projection distance

For a screen size different from the above, use the equation below to calculate the projection distance.

Aspect ratio 4 : 3
minimum L (m) = (diagonal screen size in inches) x 0.0292 – 0.036
maximum L (m) = (diagonal screen size in inches) x 0.0351 – 0.044

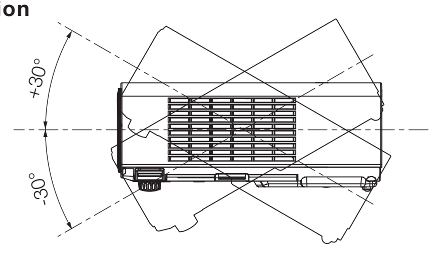
NOTE: Distances calculated with the above equations will include a slight error.

Installable Angle

Install the projector at an angle within the range shown below.

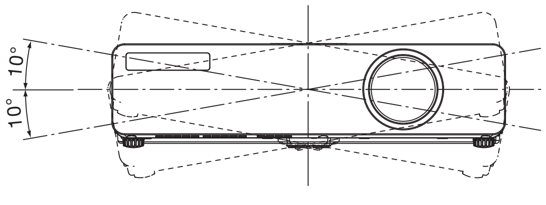
• Vertical direction

The projector may be installed at a vertical angle of ±30°.



• Horizontal direction

The projector may be installed at a horizontal angle of ±10°.



Computer data compatibility

This projector accepts up to 91 kHz horizontal scanning frequency and 193 MHz dot clock.

NOTE: Pixel thinning is applied to signals that exceed a dot clock frequency of 110 MHz. The display resolution of this projector is 1,024 x 768 pixels. Input signals that exceed this resolution will be converted to 1,024 x 768 pixels.

List of compatible signals

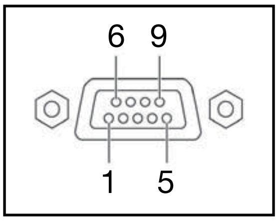
Display mode	Display resolution (dots)[1]	Scanning frequency H (kHz)	Scanning frequency V (kHz)	Dot clock frequency (MHz)	Picture quality[2]	Input terminal
NTSC/NTSC4.43/PAL-M/PAL60	720 x 480i	15.7	59.9	–	A	VIDEO/S-VIDEO
PAL/PAL-N/SECAM	720 x 576i	15.6	50.0	–	A	
525i (480i)	720 x 480i	15.7	59.9	13.5	A	COMPUTER (RGB/YPBPR)
625i (576i)	720 x 576i	15.6	50.0	13.5	A	
525p (480p)	720 x 483	31.5	59.9	27.0	A	
625p (576p)	720 x 576	31.3	50.0	27.0	A	
750 (720)/60p	1280 x 720	45.0	60.0	74.3	A	
750 (720)/50p	1280 x 720	37.5	50.0	74.3	A	
1125 (1080)/60i	1920 x 1080i	33.8	60.0	74.3	A	
1125 (1080)/50i		28.1	50.0	74.3	A	
VESA70	640 x 400	31.5	70.1	25.2	A	COMPUTER (RGB only)
VESA85		37.9	85.1	31.5	A	
VGA60	640 x 480	31.5	59.9	25.2	A	
VGA65		35.0	66.7	30.2	A	
VGA72		37.9	72.8	31.5	A	
VGA75		37.5	75.0	31.5	A	
VGA85		43.3	85.0	36.0	A	
SVGA55	800 x 600	35.2	56.3	36.0	A	
SVGA60		37.9	60.3	40.0	A	
SVGA70		48.1	72.2	50.0	A	
SVGA75		46.9	75.0	49.5	A	
SVGA85		53.7	85.1	56.3	A	
MAC16	832 x 624	49.7	74.6	57.3	A	
XGA50	1024 x 768	39.6	50.1	51.9	AA	
XGA60		48.4	60.0	65.0	AA	
XGA70		56.5	70.1	75.0	AA	
XGA75		60.0	75.0	78.8	AA	
XGA85		68.7	85.0	94.5	AA	
WIDE750 (720)	1280 x 720	44.8	59.9	74.5	A	
		37.1	49.8	60.5	A	
WXGA768	1280 x 768	39.6	49.9	65.3	A	
		47.8	59.9	79.5	A	
WXGA800	1280 x 800	41.3	50.0	68.0	A	
		49.1	60.2	69.1	A	
		49.7	59.8	83.5	A	
MXGA70	1152 x 864	64.0	71.2	94.2	A	
MXGA75		67.5	74.9	108.0	A	
MXGA85		76.7	85.0	121.5	B	
MAC21	1152 x 870	68.7	75.1	100.0	A	
MSXGA60	1280 x 960	60.0	60.0	108.0	A	
SXGA60	1280 x 1024	64.0	60.0	108.0	A	
SXGA75		80.0	75.0	135.0	B	
SXGA85		91.1	85.0	157.5	B	
SXGA60+	1400 x 1050	64.0	60.0	108.0	A	
		65.1	59.9	122.4	B	
WXGA+	1440 x 900	55.9	59.9	106.5	A	
UXGA60	1600 x 1200	75.0	60.0	162.0	B	
WSXGA+	1680 x 1050	65.3	60.0	146.3	B	
WUXGA	1920 x 1200	74.6	59.9	193.3	B	

1. The "i" appearing after the resolution indicates an interlaced signal.
2. The following symbols are used to indicate picture quality.
- **AA Maximum picture quality can be obtained.**
- **A Signals are converted by the image processing circuit before picture is projected.**
- **B Signals are compressed by the image processing circuit before picture is projected.**

Serial connector

The serial connector complies with RS-232C. To control the projector from a personal computer, commands must be input through communication software, based on the format and satisfying the communication conditions shown below.

Pin assignments and signal names



D-sub HD 9-pin, female

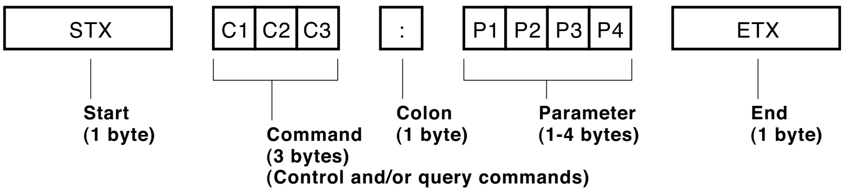
No.	Signal name	Description	No.	Signal name	Signal name
1	–	NC	6	–	NC
2	TXD	Send data	7	CTS	Connected internally
3	RXD	Receive data	8	RTS	Connected internally
4	–	Connected internally	9	–	NC
5	GND	Ground			

Communication conditions (factory setting)

Signal level	RS-232C-compliant
Synchronization method	Start-stop synchronization
Baud rate	9,600 bps
Parity	None
Character length	8 bits
Stop bit	1 bit
X parameter	None
S parameter	None

Basic format

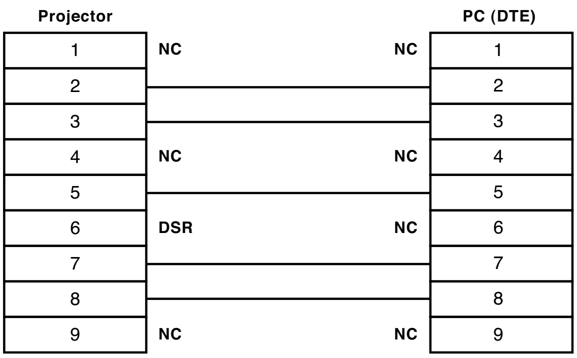
Transmission from the computer begins with STX, then the ID, command, parameter, and ETX are sent in this order. Add parameters according to the details of control.



CAUTION
It may not be possible to send or receive commands for about 10 to 60 seconds when the lamp is first turned on. If this occurs, wait for 60 seconds, then try sending or receiving again. When sending multiple commands, be sure to wait for at least 0.5 second after receiving a response from the projector before sending the next command. Additional time is sometimes required for response due to processing inside the projector. Set the time-out period for command response to 10 seconds or more.

NOTE:
If a wrong command is received, the projector will send an ER401 command to the computer.
When sending commands without parameters, a colon (:) is not necessary.

Cable specifications



Control commands

Command: <Parameter>	Function	Callback: <Parameter>	Parameter value Min	Max
PON*1/*2	Power on (standby mode on)	PON*1/*2	–	–
POF*1/*2	Power off (standby mode off)	POF*1/*2	–	–
AVL:<pl>	Volume control	AVL:<pl>	0	63
IIS:<input signal>	Input signal selection	IIS:<input signal>	–	–
OST	The same function as “default” button	OST	–	–
OFZ:<off on>	Freeze	OFZ:<off on>	0	1
OEN	Enter	OEN	–	–
OXG:0	Wide mode: Off	OXG:0	–	–
OXG:1	Wide mode: On	OXG:1	–	–
OXG:2	Wide mode: Auto	OXG:2	–	–
VPM:<NAT>	Picture mode: Natural	VPM:<NAT>	–	–
VPM:<STD>	Picture mode: Standard	VPM:<STD>	–	–
VPM:<DYN>	Picture mode: Dynamic	VPM:<DYN>	–	–
VPM:<BBD>	Picture mode: Blackboard	VPM:<BBD>	–	–
VPM:<WBD>	Picture mode: Whiteboard	VPM:<WBD>	–	–
VXX:DLVI0=<+00000>	Daylight View: Off	VXX:DLVI0=<+00000>	–	–
VXX:DLVI0=<+00001>	Daylight View: Auto	VXX:DLVI0=<+00001>	–	–
VXX:DLVI0=<+00002>	Daylight View: On	VXX:DLVI0=<+00002>	–	–
AUU	Volume up	AUU	–	–
AUD	Volume down	AUD	–	–
OMN	Menu	OMN	–	–
OCU	Cursor up	OCU	–	–
OCD	Cursor down	OCD	–	–
OCL	Cursor left	OCL	–	–
OCR	Cursor right	OCR	–	–
OAS	Auto setup	OAS	–	–
OSH*1	AV mute	OSH*1	–	–
OIX	Index window	OIX	–	–
DZU	Digital zoom: Enlargement	DZU	–	–
DZD	Digital zoom: Reduction	DZD	–	–

*1 Do not send PON, POF, or OSH commands continuously in a short period of time. Doing so may burst the lamp or shorten the lamp replacement cycle.
*2 When a command other than OSH is sent while the shutter function is operating, the projector will send an ER401 command in reply and release the shutter function.

Status asking commands

Command	Description		Callback <Parameter>
QPW	Standby power status		<power condition>
Q$S	Lamp status		<lamp condition>
QIN	Input signal status		<input signal>
QAV	Volume adjustment value		<pl>
QVC	Color adjustment value		<pl>
QVT	Tint adjustent value		<pl>
QVB	Brightness adjustment value		<pl>
QVR	Contrast adjustment value		<pl>
QVS	Sharpness adjustment value		<pl>
QWR	White balance: R adjustment value		<pl>
QWG	White balance: G adjustment value		<pl>
QWB	White balance: B adjustment value		<pl>
QHP	Horizontal position adjustment value		<pl>
QVP	Vertical position adjustment value		<pl>
QCP	Clock phase adjustment value		<pl>
QDC	Dot clock adjustment value		<pl>
QSP	Projection method status		<pl>
QLG	On-screen menu language		<pl>
QXG	Wide mode status	Off	<0>
		On	<1>
		Auto	<2>
QVX:DLVI0	Daylight View status	Off	<+00000>
		Auto	<+00001>
		On	<+00002>
QPM	Picture mode status	Natural	<NAT>
		Standard	<STD>
		Dynamic	<DYN>
		Blackboard	<BBD>
		Whiteboard	<WBD>
QFZ	Freeze status		<off_on>
Q$L	Lamp run time		<acctch>
QSH	Shutter function status		<off_on>
QKS	Keystone correction status		<pl>
QTE	Color temperature adjustment status		<color temp>

Parameter format

Parameter format	Size (Byte)	Definition
<pl>	3 (1 or 2 bytes also possible when under control)	Decimal without signs: 0 to 999 (000, 001, 002...999) Decimal with signs: -99 to +99 (-99...-01, +00, +01, +02...+99) Callback from the projector is 3 Byte.
<off on>	1	0 = off, 1 = on
<input signal>	3	RG1 = computer 1, RG2 = computer 2, NWP = network, VID = video, SVD = S-Video
<installation>	1	0 = front, 1 = rear, 2 = ceiling and front, 3 = ceiling and rear
<language>	3	ENG = English, DEU = German, FRA = French, ESP = Spanish, ITL = Italian, JPN = Japanese, CHI = Chinese, POR = Portuguese, SVE = Swedish, NOR = Norwegian, DAN = Danish, POL = Polish, CES = Czech, MAG = Hungarian, RUS = Russian, THA = Thai, KOR = Korean
<power condition>	3	000 = power off (standby mode off), 001 = power on (standby mode on)
<lamp condition>	1	0 = standby, 1 = lamp on under control, 2 = lamp off, 3 = lamp off under control
<acctch>	4	Decimal without signs: 0000-9999 hours
<color temp>	1	0 = economy, 1 = normal, 2 = high
<date>	8	y1y2y3y4m1m2d1d2w = year (y) month (m) day (d) day of week (w) Day of week: Monday = 1, Tuesday = 2, ... Sunday = 7
<time>	6	h1h2m1m2s1s2 = hour (h) minute (m) second (s)

NOTE: If a wrong command is received, the projector will send an ER401 command to the computer.

Command example

To set the volume to +30, send the command as shown right.

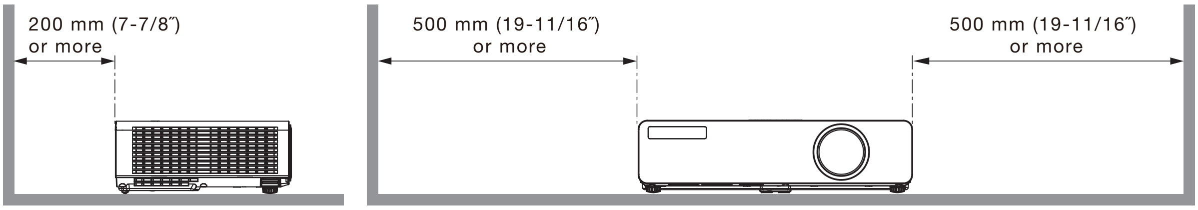
STX	AVL	:	30	ETX
Start	Command		Parameter	End

NOTE: When sending commands without parameters, a colon (:) is not necessary.

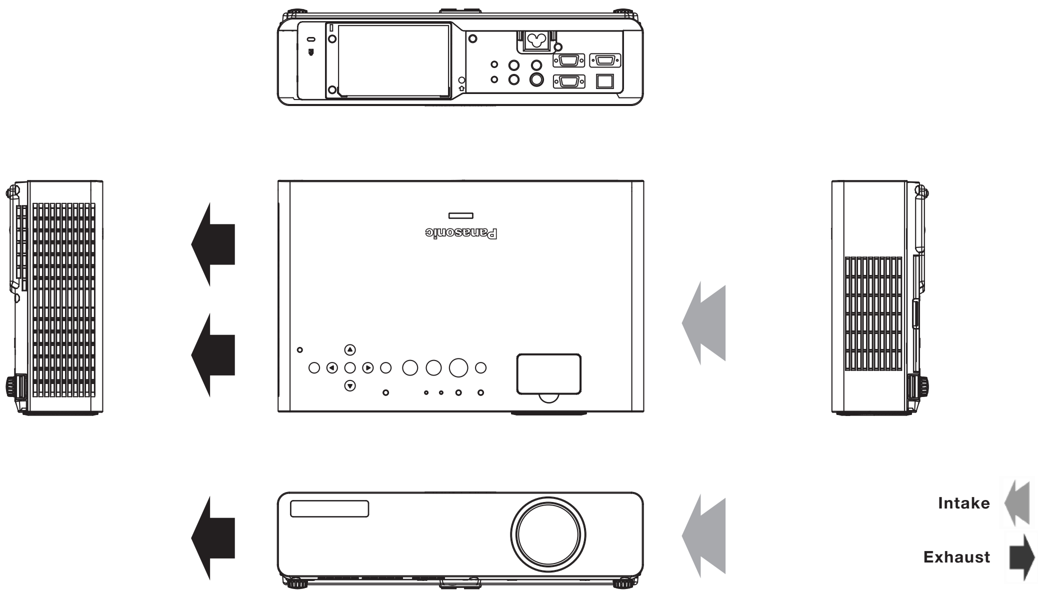
Notes on projector placement and operation

The projector uses a high-wattage lamp that becomes very hot during operation. Please observe the following precautions.

1. Never place objects on top of the projector while it is operating.
2. Make sure there is an unobstructed space of 500 mm (19-11/16″) or more around the projector's exhaust openings.
3. If the projector is placed in a box or enclosure, ensure the temperature of the air surrounding the projector is between 0°C/32°F and 35°C/95°F. Also make sure the projector's intake and exhaust openings are not blocked. Take particular care to ensure that hot air from the exhaust openings is not sucked into the intake openings.



Direction of air intake and exhaust



Operating the projector continuously

1. If the projector is to be operated continuously 10 hours or more, lamp replacement cycle duration becomes shorter.
2. The lamp replacement cycle duration becomes shorter if the projector is operated repeatedly for short periods (one hour or less).